

SEQUENCE LISTING

<110> Huang, Shi
Chadwick, Robert B.

<120> Methods of Detecting and Treating
Microsatellite-Instability Positive Tumors Using RIZ

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<150> US 60/256,582
<151> 2000-12-19

<160> 15

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Met His Gln Asn Thr Glu
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Ser Val Ala Ala Thr Glu Thr Leu Ala Glu Val Pro Glu His Val Leu
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Arg Gly Leu Pro Glu Glu Val Arg Leu Phe Pro Ser Ala Val Asp Lys
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Thr Arg Ile Gly Val Trp Ala Thr Lys Pro Ile Leu Lys Gly Lys Lys
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Phe Gly Pro Phe Val Gly Asp Lys Lys Lys Arg Ser Gln Val Arg Asn
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Asn Val Tyr Met Trp Glu Val Tyr Tyr Pro Asn Leu Gly Trp Met Cys

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tgg	gct	tgc	tca	gga	gaa	gag	cag	aat	tta	ttt	cca	ctg	gaa	atc	aac	510								
Trp	Ala	Cys	Ser	Gly	Glu	Glu	Gln	Asn	Leu	Phe	Pro	Leu	Glu	Ile	Asn									
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ctc	ctg	gtc	tgg	tac	aat	ggg	gaa	gac	aac	cct	gag	ata	gca	gct	gcg	606								
Leu	Leu	Val	Trp	Tyr	Asn	Gly	Glu	Asp	Asn	Pro	Glu	Ile	Ala	Ala	Ala									
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Ile	Glu	Glu	Glu	Arg	Ala	Ser	Ala	Arg	Ser	Lys	Arg	Ser	Ser	Pro	Lys									
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Ala	Asn	Met	Arg	Gly	Ser	Ala	Glu	Gly	Pro	Lys	Glu	Glu	Asp	Glu	Arg									
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cct	ttg	gct	tcg	gca	cct	gag	cag	cca	gcc	cct	ctg	ccg	gag	gtg	ggg	846								
Pro	Leu	Ala	Ser	Ala	Pro	Glu	Gln	Pro	Ala	Pro	Leu	Pro	Glu	Val	Gly									
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Asn	Gln	Asp	Ala	Val	Pro	Gln	Val	Ala	Ile	Pro	Leu	Pro	Ala	Cys	Glu									
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Asn	Asp	Val	Glu	Glu	Glu	Glu	Leu	Glu	Glu	Glu	Glu	Glu	Leu	Glu	Glu									
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Glu	Glu	Glu	Glu	Glu	Leu	Gly	Glu	Asp	Gly	Val	Glu	Glu	Ala	Asp	Met									
280				285				290																

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Pro	Asn	Glu	Ser	Ser	Ala	Lys	Glu	Pro	Glu	Ile	Arg	Cys	Glu	Glu	Lys	
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cca	gaa	gac	tta	tta	gaa	gag	cca	cag	agc	atg	tcg	aat	gaa	gct	cgt	1134
Pro	Glu	Asp	Leu	Leu	Glu	Glu	Pro	Gln	Ser	Met	Ser	Asn	Glu	Ala	Arg	
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gaa	gac	tct	cca	gac	gtg	acc	cct	cct	ccc	cac	act	ccc	aga	gct	aga	1182
Glu	Asp	Ser	Pro	Asp	Val	Thr	Pro	Pro	Pro	His	Thr	Pro	Arg	Ala	Arg	
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gag	gag	gcc	aac	ggg	gat	gta	ctt	gag	aca	ttt	atg	ttt	ccg	tgt	cag	1230
Glu	Glu	Ala	Asn	Gly	Asp	Val	Leu	Glu	Thr	Phe	Met	Phe	Pro	Cys	Gln	
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cac	tgt	gaa	aga	aaa	ttt	gca	acg	aag	cag	ggg	cta	gag	cgt	cac	atg	1278
His	Cys	Glu	Arg	Lys	Phe	Ala	Thr	Lys	Gln	Gly	Leu	Glu	Arg	His	Met	
	360					365					370					
cac	atc	cac	att	tct	acc	atc	aat	cat	gct	ttc	aag	tgc	aag	tac	tgt	1326
His	Ile	His	Ile	Ser	Thr	Ile	Asn	His	Ala	Phe	Lys	Cys	Lys	Tyr	Cys	
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Gly	Lys	Arg	Phe	Gly	Thr	Gln	Ile	Asn	Arg	Arg	Arg	His	Glu	Arg	Arg	
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cac	gaa	acg	ggg	ttg	aag	aga	aga	ccc	agc	atg	act	tta	cag	tcc	tca	1422
His	Glu	Thr	Gly	Leu	Lys	Arg	Arg	Pro	Ser	Met	Thr	Leu	Gln	Ser	Ser	
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gag	gat	cca	gat	gat	ggc	aag	ggg	gaa	aat	gtt	act	tct	aaa	gat	gag	1470
Glu	Asp	Pro	Asp	Asp	Gly	Lys	Gly	Glu	Asn	Val	Thr	Ser	Lys	Asp	Glu	
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	440					445					450					
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Lys	Thr	Ser	Gln	Glu	Val	Leu	Asn	Ser	Ser	Phe	Val	Glu	Glu	Asn	Gly	
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Glu	Val	Lys	Glu	Leu	His	Pro	Cys	Lys	Tyr	Cys	Lys	Lys	Val	Phe	Gly	
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act	cac	acc	aat	atg	aga	cga	cat	cag	cgt	aga	gtt	cat	gag	cgc	cac	1662
Thr	His	Thr	Asn	Met	Arg	Arg	His	Gln	Arg	Arg	Val	His	Glu	Arg	His	
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Leu Ile Pro Lys Gly Val Arg Arg Lys Gly Gly Leu Leu Glu Glu Pro	
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Gln Pro Pro Ala Glu Gln Ala Pro Pro Ser Gln Asn Val Tyr Val Pro	
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Ser Thr Glu Pro Glu Glu Glu Gly Glu Thr Asp Asp Val Tyr Ile Met	
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Asp Ile Ser Ser Asn Ile Ser Glu Asn Leu Asn Tyr Tyr Ile Asp Gly	
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Lys Ile Gln Thr Asn Ser Ser Thr Ser Asn Cys Asp Val Ile Glu Met	
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Leu Thr Leu Pro Ala Gly Phe Ser Ala Ala Glu Ile Pro Lys Leu Gly	
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Thr	Asp	Thr	Val	Leu	Thr	Ser	Lys	Lys	Pro	Lys	Leu	Glu	Ser	Arg	Ser	
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Asp	Ser	Pro	Ala	Trp	Ser	Leu	Ser	Gly	Arg	Asp	Glu	Arg	Glu	Thr	Gly	
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Ser	Ser	Thr	Phe	Ser	Ser	Val	Cys	Asn	Gln	Gln	Pro	Leu	Asp	Leu	Ser	
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Trp	Glu	Ser	Val	Leu	Asp	Leu	Ser	Val	His	Lys	Lys	Pro	Cys	Asp	Ser	
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Ser	Pro	Ser	Pro	Cys	Lys	Ser	Pro	Asp	Thr	Gln	Pro	Asp	Pro	Glu	Leu	
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Gly	Pro	Asp	Ser	Ser	Cys	Ser	Val	Pro	Thr	Ala	Glu	Ser	Pro	Pro	Glu	

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Cys Pro Ser Pro Phe Ser Asn Thr Thr Ala Gln Ser Pro Leu Pro Ile			
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Asp Asn Leu Glu Ala Ser Leu Pro Ala Val Thr Phe Lys Gln Glu Glu			
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Ser Glu Ser Glu Gly Leu Lys Pro Lys Glu Glu Ala Pro Pro Ala Gly			
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Phe Leu Cys Asn Leu Gln Gln His Gln Arg Asp Leu His Pro Asp Glu	
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Glu Glu Leu Tyr Thr Thr Ile Lys Ile Met Ala Ser Gly Ile Lys Thr	
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Lys Asp Pro Asp Val Arg Leu Gly Leu Asn Gln His Tyr Pro Ser Phe	
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Arg Tyr Thr Pro Lys Lys Asn Pro Val Pro Leu Lys Gln Thr Val Gln	
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Pro Lys Asn Gly Val Val Val Leu Asp Asn Ser Gly Lys Asn Ala Phe	
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Gln Leu Val Gln Lys Ala Ile Leu Gln Lys Asn Arg Ala Ala Lys Gln	
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Lys Ala Asp Leu Arg Asp Thr Ser Glu Ala Ser Ser His Ile Cys Pro	
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Tyr Cys Asp Arg Glu Phe Thr Tyr Ile Gly Ser Leu Asn Lys His Ala	
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gcc ttc agc tgt cct aaa aaa cct ctt tct cct tcc aaa aga aaa gtt	4590
Ala Phe Ser Cys Pro Lys Lys Pro Leu Ser Pro Ser Lys Arg Lys Val	
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Ser His Ser Ser Lys Lys Gly Gly His Ala Ser Ser Ser Ser Asp	
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Lys Met Gln Ser Thr Gln Ala Pro Leu Gly Lys Thr Arg Ala Arg Ser	
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Arg	Ser	Gln	Val	Arg	Asn	Asn	Val	Tyr	Met	Trp	Glu	Val	Tyr	Tyr	Pro
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Asn	Leu	Gly	Trp	Met	Cys	Ile	Asp	Ala	Thr	Asp	Pro	Glu	Lys	Gly	Asn
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Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu	Glu	Gln	Asn	Leu
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Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys	Thr	Leu	Lys	Pro
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Gln	Asn	Val	Tyr	Val	Pro	Ser	Thr	Glu	Pro	Glu	Glu	Glu	Gly	Glu	Thr	
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Asp	Cys	Leu	Leu	Thr	Pro	Val	Thr	Val	Glu	Ile	Thr	Gln	Asn	Ile	Lys	
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Ala Ser Gly	Ile Lys Thr Lys	Asp Pro Asp Val	Arg Leu Gly Leu Asn		
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Gln His Tyr	Pro Ser Phe Lys	Pro Pro Phe Gln	Tyr His His Arg		
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Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	Gly	Glu	Asp		
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Gln Asp Thr Ile Asn Ser Ser Val Val Glu Glu Asn Gly Glu Val Lys			
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Glu Leu His Pro Cys Lys Tyr Cys Lys Lys Val Phe Gly Thr His Thr			
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Asn Met Arg Arg His Gln Arg Arg Val His Glu Arg His Leu Ile Pro			
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Lys Gly Val Arg Arg Lys Gly Gly Leu Glu Glu Pro Gln Pro Pro Ala			
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gaa cag gcc cag gcc acc cag aac gtg tat gta cca agc aca gag ccg			1752
Glu Gln Ala Gln Ala Thr Gln Asn Val Tyr Val Pro Ser Thr Glu Pro			
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Glu Glu Glu Gly Glu Ala Asp Asp Val Tyr Ile Met Asp Ile Ser Ser	
545 550 555 560	
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Asn Ile Ser Glu Asn Leu Asn Tyr Tyr Ile Asp Gly Lys Ile Gln Thr	
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aat aac aac act agt aac tgt gat gtg att gag atg gag tct gct tcg	1896
Asn Asn Asn Thr Ser Asn Cys Asp Val Ile Glu Met Glu Ser Ala Ser	
580 585 590	
gca gat ttg tat ggt ata aat tgt ctg ctc act cca gtt aca gtg gaa	1944
Ala Asp Leu Tyr Gly Ile Asn Cys Leu Leu Thr Pro Val Thr Val Glu	
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att act caa aat ata aag acc aca cag gtc cct gta aca gaa gat ctt	1992
Ile Thr Gln Asn Ile Lys Thr Thr Gln Val Pro Val Thr Glu Asp Leu	
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cct aaa gag cct ttg ggc agc aca aat agt gag gcc aag aag cgg aga	2040
Pro Lys Glu Pro Leu Gly Ser Thr Asn Ser Glu Ala Lys Lys Arg Arg	
625 630 635 640	
act gcg agc cca cct gca ctg ccc aaa att aag gcc gaa aca gac tct	2088
Thr Ala Ser Pro Pro Ala Leu Pro Lys Ile Lys Ala Glu Thr Asp Ser	
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Asp Pro Met Val Pro Ser Cys Ser Leu Ser Leu Pro Leu Ser Ile Ser	
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aca aca gag gca gtg tct ttc cac aaa gag aaa agt gtt tat ttg tca	2184
Thr Thr Glu Ala Val Ser Phe His Lys Glu Lys Ser Val Tyr Leu Ser	
675 680 685	
tca aag ctc aaa caa ctt ctt caa acc caa gat aaa cta act cct cct	2232
Ser Lys Leu Lys Gln Leu Leu Gln Thr Gln Asp Lys Leu Thr Pro Pro	
690 695 700	
gca ggg att tca gca act gaa ata gct aaa tta ggt cct gtt tgt gtg	2280
Ala Gly Ile Ser Ala Thr Glu Ile Ala Lys Leu Gly Pro Val Cys Val	
705 710 715 720	
tct gct cct gca tca atg ttg cct gtg acc tca agt agg ttt aag agg	2328
Ser Ala Pro Ala Ser Met Leu Pro Val Thr Ser Ser Arg Phe Lys Arg	
725 730 735	
cgg acc agc tct cct ccc agt tct cca cag cac agt cct gcc ctt cga	2376
Arg Thr Ser Ser Pro Pro Ser Ser Pro Gln His Ser Pro Ala Leu Arg	
740 745 750	

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Asp Phe Gly Lys Pro Ser Asp Gly Lys Ala Ala Trp Thr Asp Ala Gly	
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ctg act tcc aaa aaa tcc aaa tta gaa agt cac agc gac tca cca gca	2472
Leu Thr Ser Lys Lys Ser Lys Leu Glu Ser His Ser Asp Ser Pro Ala	
770 775 780	
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Trp Ser Leu Ser Gly Arg Asp Glu Arg Glu Thr Val Ser Pro Pro Cys	
785 790 795 800	
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Phe Asp Glu Tyr Lys Met Ser Lys Glu Trp Thr Ala Ser Ser Ala Phe	
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agc agt gtg tgc aac cag cag cca ctg gat tta tcc agc ggt gtc aaa	2616
Ser Ser Val Cys Asn Gln Gln Pro Leu Asp Leu Ser Ser Gly Val Lys	
820 825 830	
cag aag gct gag ggt aca ggc aag act cca gtc cag tgg gaa tct gtc	2664
Gln Lys Ala Glu Gly Thr Gly Lys Thr Pro Val Gln Trp Glu Ser Val	
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tta gat ctc agt gtg cat aaa aag cat tgt agt gac tct gaa ggc aag	2712
Leu Asp Leu Ser Val His Lys Lys His Cys Ser Asp Ser Glu Gly Lys	
850 855 860	
gaa ttc aaa gaa agt cat tca gtg cag cct acg tgt agt gct gta aag	2760
Glu Phe Lys Glu Ser His Ser Val Gln Pro Thr Cys Ser Ala Val Lys	
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Lys Arg Lys Pro Thr Thr Cys Met Leu Gln Lys Val Leu Leu Asn Glu	
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tat aat ggc atc gat tta cct gta gaa aac cct gca gat ggg acc agg	2856
Tyr Asn Gly Ile Asp Leu Pro Val Glu Asn Pro Ala Asp Gly Thr Arg	
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Ser Pro Ser Pro Cys Lys Ser Leu Glu Ala Gln Pro Asp Pro Asp Leu	
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Gly Pro Gly Ser Gly Phe Pro Ala Pro Thr Val Glu Ser Thr Pro Asp	
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Val Cys Pro Ser Ser Pro Ala Leu Gln Thr Pro Ser Leu Ser Ser Gly	
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Gln	Leu	Pro	Pro	Leu	Leu	Ile	Pro	Thr	Asp	Pro	Ser	Ser	Pro	Pro	Pro		
				965					970					975			
tgt	ccc	ccg	gta	tta	act	gtt	gcc	act	ccg	ccc	cct	ccc	ctc	ctt	cct	3096	
Cys	Pro	Pro	Val	Leu	Thr	Val	Ala	Thr	Pro	Pro	Pro	Pro	Leu	Leu	Pro		
			980					985					990				
acc	gta	cct	ctt	cca	gcc	ccc	tct	tcc	agt	gca	tct	cca	cac	cca	tgc	3144	
Thr	Val	Pro	Leu	Pro	Ala	Pro	Ser	Ser	Ser	Ala	Ser	Pro	His	Pro	Cys		
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ccc	tct	cca	ctc	tca	aat	gcc	acc	gca	cag	tcc	cca	ctt	cca	att	ctg	3192	
Pro	Ser	Pro	Leu	Ser	Asn	Ala	Thr	Ala	Gln	Ser	Pro	Leu	Pro	Ile	Leu		
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tcc	cca	aca	gtg	tcc	ccc	tct	ccc	tct	ccc	att	cct	ccc	gtg	gag	ccc	3240	
Ser	Pro	Thr	Val	Ser	Pro	Ser	Pro	Ser	Pro	Ile	Pro	Pro	Val	Glu	Pro		
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ctg	atg	tct	gcc	gcc	tca	ccc	ggg	cct	cca	aca	ctt	tct	tct	tcc	tcc	3288	
Leu	Met	Ser	Ala	Ala	Ser	Pro	Gly	Pro	Pro	Thr	Leu	Ser	Ser	Ser	Ser		
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Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Phe	Ser	Ser	Ser	Ser	Ser	Ser	Ser		
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Ser	Pro	Ser	Pro	Pro	Pro	Leu	Ser	Ala	Ile	Ser	Ser	Val	Val	Ser	Ser		
			1075				1080					1085					
ggt	gat	aat	ctg	gag	gct	tct	ctc	ccc	atg	ata	tct	ttc	aaa	cag	gag	3432	
Gly	Asp	Asn	Leu	Glu	Ala	Ser	Leu	Pro	Met	Ile	Ser	Phe	Lys	Gln	Glu		
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gaa	tta	gag	aat	gaa	ggt	ctg	aaa	ccc	agg	gaa	gag	ccc	cag	tct	gct	3480	
Glu	Leu	Glu	Asn	Glu	Gly	Leu	Lys	Pro	Arg	Glu	Glu	Pro	Gln	Ser	Ala		
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gct	gaa	cag	gat	gtt	gtt	gtt	cag	gaa	aca	ttc	aac	aaa	aac	ttt	gtt	3528	
Ala	Glu	Gln	Asp	Val	Val	Val	Gln	Glu	Thr	Phe	Asn	Lys	Asn	Phe	Val		
				1125				1130					1135				
tgc	aac	gtc	tgt	gaa	tca	cct	ttt	ctt	tcc	att	aaa	gat	cta	acc	aaa	3576	
Cys	Asn	Val	Cys	Glu	Ser	Pro	Phe	Leu	Ser	Ile	Lys	Asp	Leu	Thr	Lys		
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cat	tta	tct	att	cat	gct	gaa	gaa	tgg	ccc	ttc	aaa	tgt	gaa	ttt	tgt	3624	
His	Leu	Ser	Ile	His	Ala	Glu	Glu	Trp	Pro	Phe	Lys	Cys	Glu	Phe	Cys		
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gtg	cag	ctt	ttt	aag	gat	aaa	acg	gac	ttg	tca	gaa	cat	cgc	ttt	ttg	3672	
Val	Gln	Leu	Phe	Lys	Asp	Lys	Thr	Asp	Leu	Ser	Glu	His	Arg	Phe	Leu		

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Leu His Gly Val Gly Asn Ile Phe Val Cys Ser Val Cys Lys Lys Glu			
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Phe Ala Phe Leu Cys Asn Leu Gln Gln His Gln Arg Asp Leu His Pro			
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Asp Lys Val Cys Thr His His Glu Phe Glu Ser Gly Thr Leu Arg Pro			
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cag aac ttt aca gat ccc agc aag gcc cat gta gag cat atg cag agc			3864
Gln Asn Phe Thr Asp Pro Ser Lys Ala His Val Glu His Met Gln Ser			
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Leu Pro Glu Asp Pro Leu Glu Thr Ser Lys Glu Glu Glu Glu Leu Asn			
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gat tcc tct gaa gag ctt tac acg act ata aaa ata atg gct tct gga			3960
Asp Ser Ser Glu Glu Leu Tyr Thr Thr Ile Lys Ile Met Ala Ser Gly			
1265	1270	1275	1280
ata aag aca aaa gat cca gat gtt cga ttg ggc ctc aat cag cat tac			4008
Ile Lys Thr Lys Asp Pro Asp Val Arg Leu Gly Leu Asn Gln His Tyr			
	1285	1290	1295
cca agc ttt aaa cca cct cca ttt cag tac cat cac cgt aac ccc atg			4056
Pro Ser Phe Lys Pro Pro Pro Phe Gln Tyr His His Arg Asn Pro Met			
	1300	1305	1310
ggg att ggt gtg aca gcc aca aat ttc act aca cac aat att cca cag			4104
Gly Ile Gly Val Thr Ala Thr Asn Phe Thr Thr His Asn Ile Pro Gln			
	1315	1320	1325
act ttc act acc gcc att cgc tgc aca aag tgt gga aaa ggt gtc gac			4152
Thr Phe Thr Thr Ala Ile Arg Cys Thr Lys Cys Gly Lys Gly Val Asp			
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aat atg ccg gag ttg cac aaa cat atc ctg gct tgt gct tct gca agt			4200
Asn Met Pro Glu Leu His Lys His Ile Leu Ala Cys Ala Ser Ala Ser			
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gac aag aag agg tac acg cct aag aaa aac cca gta cca tta aaa caa			4248
Asp Lys Lys Arg Tyr Thr Pro Lys Lys Asn Pro Val Pro Leu Lys Gln			
	1365	1370	1375
act gtg caa ccc aaa aat ggc gtg gtg gtt tta gat aac tct ggg aaa			4296
Thr Val Gln Pro Lys Asn Gly Val Val Val Leu Asp Asn Ser Gly Lys			
	1380	1385	1390

aat gcc ttc cga cga atg gga cag ccc aaa agg ctt aac ttt agt gtt	4344
Asn Ala Phe Arg Arg Met Gly Gln Pro Lys Arg Leu Asn Phe Ser Val	
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Glu Leu Ser Lys Met Ser Ser Asn Lys Leu Lys Leu Asn Ala Leu Lys	
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aaa aaa aat cag cta gta cag aaa gca att ctt cag aaa aac aaa tct	4440
Lys Lys Asn Gln Leu Val Gln Lys Ala Ile Leu Gln Lys Asn Lys Ser	
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gca aag cag aag gcc gac ttg aaa aat gct tgt gag tca tcc tct cac	4488
Ala Lys Gln Lys Ala Asp Leu Lys Asn Ala Cys Glu Ser Ser Ser His	
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atc tgc cct tac tgt aat cga gag ttc act tac att gga agc ctg aat	4536
Ile Cys Pro Tyr Cys Asn Arg Glu Phe Thr Tyr Ile Gly Ser Leu Asn	
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Lys His Ala Ala Phe Ser Cys Pro Lys Lys Pro Leu Ser Pro Pro Lys	
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Lys Lys Val Ser His Ser Ser Lys Lys Gly Gly His Ser Ser Pro Ala	
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Ser Ser Asp Lys Asn Ser Asn Ser Asn His Arg Arg Arg Thr Ala Asp	
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Ala Glu Ile Lys Met Gln Ser Met Gln Thr Pro Leu Gly Lys Thr Arg	
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Ala Arg Ser Ser Gly Pro Thr Gln Val Pro Leu Pro Ser Ser Ser Phe	
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Arg Ser Lys Gln Asn Val Lys Phe Ala Ala Ser Val Lys Ser Lys Lys	
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cca agc tcc tcc tct tta agg aac tcc agc ccg ata aga atg gcc aaa	4872
Pro Ser Ser Ser Ser Leu Arg Asn Ser Ser Pro Ile Arg Met Ala Lys	
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Gln Lys Ser Lys Ala Val Leu Gln Ser Lys Ser Thr Leu Ala Ser Lys
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Lys Arg Thr Asp Arg Phe Asn Ile Lys Ser Arg Glu Arg Ser Gly Gly
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Pro Val Thr Arg Ser Leu Gln Leu Ala Ala Ala Asp Leu Ser Glu
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Asn Lys Arg Glu Asp Gly Ser Ala Lys Gln Glu Leu Lys Asp Phe Ser
1665 1670 1675 1680

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Tyr Ser Leu Arg Leu Ala Ser Arg Cys Ser Pro Pro Ala Ala Ser Tyr
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Ile Thr Arg Gln Tyr Arg Lys Val Lys Ala Pro Ala Ala Gln Phe
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Glu Val Pro Glu His Val Leu Arg Gly Leu Pro Glu Glu Val Arg Leu
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Phe	Pro	Ser	Ala	Val	Asp	Lys	Thr	Arg	Ile	Gly	Val	Trp	Ala	Thr	Lys
		35					40					45			
Pro	Ile	Leu	Lys	Gly	Lys	Lys	Phe	Gly	Pro	Phe	Val	Gly	Asp	Lys	Lys
	50					55					60				
Lys	Arg	Ser	Gln	Val	Lys	Asn	Asn	Val	Tyr	Met	Trp	Glu	Val	Tyr	Tyr
65					70					75					80
Pro	Asn	Leu	Gly	Trp	Met	Cys	Ile	Asp	Ala	Thr	Asp	Pro	Glu	Lys	Gly
			85						90					95	
Asn	Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu	Glu	Gln	Asn
		100						105						110	
Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys	Thr	Leu	Lys
	115						120					125			
Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	Gly	Glu	Asp
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Asn	Pro	Glu	Ile	Ala	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala	Ser	Ala	Arg
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Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Lys	Gly	Lys	Lys	Lys	Ser	Gln
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Glu	Asn	Lys	Asn	Lys	Gly	Asn	Lys	Ile	Gln	Asp	Ile	Gln	Leu	Lys	Thr
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Ser	Glu	Pro	Asp	Phe	Thr	Ser	Ala	Asn	Met	Arg	Asp	Ser	Ala	Glu	Gly
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Pro	Lys	Glu	Asp	Glu	Glu	Lys	Pro	Ser	Ala	Ser	Ala	Leu	Glu	Gln	Pro
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Ala	Thr	Leu	Gln	Glu	Val	Ala	Ser	Gln	Glu	Val	Pro	Pro	Glu	Leu	Ala
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Thr	Pro	Ala	Pro	Ala	Trp	Glu	Pro	Gln	Pro	Glu	Pro	Asp	Glu	Arg	Leu
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Glu	Ala	Ala	Ala	Cys	Glu	Val	Asn	Asp	Leu	Gly	Glu	Glu	Glu	Glu	Glu
		260					265						270		
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	275						280					285			
Leu	Glu	Asp	Glu	Gly	Glu	Glu	Glu	Ala	Ser	Met	Pro	Asn	Glu	Asn	Ser
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Val	Lys	Glu	Pro	Glu	Ile	Arg	Cys	Asp	Glu	Lys	Pro	Glu	Asp	Leu	Leu
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Glu	Glu	Pro	Lys	Thr	Thr	Ser	Glu	Glu	Thr	Leu	Glu	Asp	Cys	Ser	Glu
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Val	Thr	Pro	Ala	Met	Gln	Ile	Pro	Arg	Thr	Lys	Glu	Glu	Ala	Asn	Gly
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Asp	Val	Phe	Glu	Thr	Phe	Met	Phe	Pro	Cys	Gln	His	Cys	Glu	Arg	Lys
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Phe	Thr	Lys	Gln	Gly	Leu	Glu	Arg	His	Met	His	Ile	His	Ile	Ile	Ser
	370				375					380					
Thr	Val	Asn	His	Ala	Phe	Lys	Cys	Lys	Tyr	Cys	Gly	Lys	Ala	Phe	Gly
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Thr	Gln	Ile	Asn	Arg	Arg	Arg	His	Glu	Arg	Arg	His	Glu	Ala	Gly	Leu
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Lys	Arg	Lys	Pro	Ser	Gln	Thr	Leu	Gln	Pro	Ser	Glu	Asp	Leu	Ala	Asp
		420						425				430			
Gly	Lys	Ala	Ser	Gly	Glu	Asn	Val	Ala	Ser	Lys	Asp	Asp	Ser	Ser	Pro
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Pro	Ser	Leu	Gly	Pro	Asp	Cys	Leu	Ile	Met	Asn	Ser	Glu	Lys	Ala	Ser

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Gln Asp Thr Ile Asn Ser Val Val Glu Glu Asn Gly Glu Val Lys				
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Glu Leu His Pro Cys Lys Tyr Cys Lys Lys Val Phe Gly Thr His Thr				
	485		490	495
Asn Met Arg Arg His Gln Arg Arg Val His Glu Arg His Leu Ile Pro				
	500		505	510
Lys Gly Val Arg Arg Lys Gly Gly Leu Glu Glu Pro Gln Pro Pro Ala				
	515		520	525
Glu Gln Ala Gln Ala Thr Gln Asn Val Tyr Val Pro Ser Thr Glu Pro				
	530		535	540
Glu Glu Glu Gly Glu Ala Asp Asp Val Tyr Ile Met Asp Ile Ser Ser				
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Asn Ile Ser Glu Asn Leu Asn Tyr Tyr Ile Asp Gly Lys Ile Gln Thr				
	565		570	575
Asn Asn Asn Thr Ser Asn Cys Asp Val Ile Glu Met Glu Ser Ala Ser				
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Ala Asp Leu Tyr Gly Ile Asn Cys Leu Leu Thr Pro Val Thr Val Glu				
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Ile Thr Gln Asn Ile Lys Thr Thr Gln Val Pro Val Thr Glu Asp Leu				
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Pro Lys Glu Pro Leu Gly Ser Thr Asn Ser Glu Ala Lys Lys Arg Arg				
625		630		640
Thr Ala Ser Pro Pro Ala Leu Pro Lys Ile Lys Ala Glu Thr Asp Ser				
	645		650	655
Asp Pro Met Val Pro Ser Cys Ser Leu Ser Leu Pro Leu Ser Ile Ser				
	660		665	670
Thr Thr Glu Ala Val Ser Phe His Lys Glu Lys Ser Val Tyr Leu Ser				
	675		680	685
Ser Lys Leu Lys Gln Leu Leu Gln Thr Gln Asp Lys Leu Thr Pro Pro				
690		695		700
Ala Gly Ile Ser Ala Thr Glu Ile Ala Lys Leu Gly Pro Val Cys Val				
705		710		720
Ser Ala Pro Ala Ser Met Leu Pro Val Thr Ser Ser Arg Phe Lys Arg				
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Arg Thr Ser Ser Pro Pro Ser Ser Pro Gln His Ser Pro Ala Leu Arg				
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Asp Phe Gly Lys Pro Ser Asp Gly Lys Ala Ala Trp Thr Asp Ala Gly				
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Leu Thr Ser Lys Lys Ser Lys Leu Glu Ser His Ser Asp Ser Pro Ala				
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Trp Ser Leu Ser Gly Arg Asp Glu Arg Glu Thr Val Ser Pro Pro Cys				
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Phe Asp Glu Tyr Lys Met Ser Lys Glu Trp Thr Ala Ser Ser Ala Phe				
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Ser Ser Val Cys Asn Gln Gln Pro Leu Asp Leu Ser Ser Gly Val Lys				
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Gln Lys Ala Glu Gly Thr Gly Lys Thr Pro Val Gln Trp Glu Ser Val				
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Leu Asp Leu Ser Val His Lys Lys His Cys Ser Asp Ser Glu Gly Lys				
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Glu Phe Lys Glu Ser His Ser Val Gln Pro Thr Cys Ser Ala Val Lys				
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Tyr	Asn	Gly	Ile	Asp	Leu	Pro	Val	Glu	Asn	Pro	Ala	Asp	Gly	Thr	Arg		
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Ser	Pro	Ser	Pro	Cys	Lys	Ser	Leu	Glu	Ala	Gln	Pro	Asp	Pro	Asp	Leu		
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Gly	Pro	Gly	Ser	Gly	Phe	Pro	Ala	Pro	Thr	Val	Glu	Ser	Thr	Pro	Asp		
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Val	Cys	Pro	Ser	Ser	Pro	Ala	Leu	Gln	Thr	Pro	Ser	Leu	Ser	Ser	Gly		
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Gln	Leu	Pro	Pro	Leu	Leu	Ile	Pro	Thr	Asp	Pro	Ser	Ser	Pro	Pro	Pro		
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Cys	Pro	Pro	Val	Leu	Thr	Val	Ala	Thr	Pro	Pro	Pro	Pro	Leu	Leu	Pro		
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Thr	Val	Pro	Leu	Pro	Ala	Pro	Ser	Ser	Ser	Ala	Ser	Pro	His	Pro	Cys		
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Pro	Ser	Pro	Leu	Ser	Asn	Ala	Thr	Ala	Gln	Ser	Pro	Leu	Pro	Ile	Leu		
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Ser	Pro	Thr	Val	Ser	Pro	Ser	Pro	Ser	Pro	Ile	Pro	Pro	Val	Glu	Pro		
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Leu	Met	Ser	Ala	Ala	Ser	Pro	Gly	Pro	Pro	Thr	Leu	Ser	Ser	Ser	Ser		
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Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Phe	Ser	Ser	Ser	Ser	Ser	Ser	Ser		
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Ser	Pro	Ser	Pro	Pro	Pro	Leu	Ser	Ala	Ile	Ser	Ser	Val	Val	Ser	Ser		
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Gly	Asp	Asn	Leu	Glu	Ala	Ser	Leu	Pro	Met	Ile	Ser	Phe	Lys	Gln	Glu		
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Glu	Leu	Glu	Asn	Glu	Gly	Leu	Lys	Pro	Arg	Glu	Glu	Pro	Gln	Ser	Ala		
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Ala	Glu	Gln	Asp	Val	Val	Gln	Glu	Thr	Phe	Asn	Lys	Asn	Phe	Val			
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Cys	Asn	Val	Cys	Glu	Ser	Pro	Phe	Leu	Ser	Ile	Lys	Asp	Leu	Thr	Lys		
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His	Leu	Ser	Ile	His	Ala	Glu	Glu	Trp	Pro	Phe	Lys	Cys	Glu	Phe	Cys		
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Val	Gln	Leu	Phe	Lys	Asp	Lys	Thr	Asp	Leu	Ser	Glu	His	Arg	Phe	Leu		
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Leu	His	Gly	Val	Gly	Asn	Ile	Phe	Val	Cys	Ser	Val	Cys	Lys	Lys	Glu		
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Phe	Ala	Phe	Leu	Cys	Asn	Leu	Gln	Gln	His	Gln	Arg	Asp	Leu	His	Pro		
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Asp	Lys	Val	Cys	Thr	His	His	Glu	Phe	Glu	Ser	Gly	Thr	Leu	Arg	Pro		
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Gln	Asn	Phe	Thr	Asp	Pro	Ser	Lys	Ala	His	Val	Glu	His	Met	Gln	Ser		
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Leu	Pro	Glu	Asp	Pro	Leu	Glu	Thr	Ser	Lys	Glu	Glu	Glu	Glu	Leu	Asn		
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Asp	Ser	Ser	Glu	Glu	Leu	Tyr	Thr	Thr	Ile	Lys	Ile	Met	Ala	Ser	Gly		
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Ile	Lys	Thr	Lys	Asp	Pro	Asp	Val	Arg	Leu	Gly	Leu	Asn	Gln	His	Tyr		
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Pro	Ser	Phe	Lys	Pro	Pro	Pro	Phe	Gln	Tyr	His	His	Arg	Asn	Pro	Met		

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Gly Ile Gly Val Thr Ala Thr Asn Phe Thr Thr His Asn Ile Pro Gln					
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Thr Phe Thr Thr Ala Ile Arg Cys Thr Lys Cys Gly Lys Gly Val Asp					
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Asn Met Pro Glu Leu His Lys His Ile Leu Ala Cys Ala Ser Ala Ser					
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Asp Lys Lys Arg Tyr Thr Pro Lys Lys Asn Pro Val Pro Leu Lys Gln					
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Thr Val Gln Pro Lys Asn Gly Val Val Val Leu Asp Asn Ser Gly Lys					
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Asn Ala Phe Arg Arg Met Gly Gln Pro Lys Arg Leu Asn Phe Ser Val					
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Glu Leu Ser Lys Met Ser Ser Asn Lys Leu Lys Leu Asn Ala Leu Lys					
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Lys Lys Asn Gln Leu Val Gln Lys Ala Ile Leu Gln Lys Asn Lys Ser					
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Ala Lys Gln Lys Ala Asp Leu Lys Asn Ala Cys Glu Ser Ser Ser His					
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Ile Cys Pro Tyr Cys Asn Arg Glu Phe Thr Tyr Ile Gly Ser Leu Asn					
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Lys His Ala Ala Phe Ser Cys Pro Lys Lys Pro Leu Ser Pro Pro Lys					
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Lys Lys Val Ser His Ser Ser Lys Lys Gly Gly His Ser Ser Pro Ala					
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Ala Arg Ser Ser Gly Pro Thr Gln Val Pro Leu Pro Ser Ser Ser Phe					
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Arg Ser Lys Gln Asn Val Lys Phe Ala Ala Ser Val Lys Ser Lys Lys					
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Pro Ser Ser Ser Ser Leu Arg Asn Ser Ser Pro Ile Arg Met Ala Lys					
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Gln Lys Ser Lys Ala Val Leu Gln Ser Lys Ser Thr Leu Ala Ser Lys					
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Lys Arg Thr Asp Arg Phe Asn Ile Lys Ser Arg Glu Arg Ser Gly Gly					
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Pro Val Thr Arg Ser Leu Gln Leu Ala Ala Ala Ala Asp Leu Ser Glu					
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Asn Lys Arg Glu Asp Gly Ser Ala Lys Gln Glu Leu Lys Asp Phe Ser					
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Tyr Ser Leu Arg Leu Ala Ser Arg Cys Ser Pro Pro Ala Ala Ser Tyr					
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Trp Met Cys Ile Asp Ala Thr Asp Pro Glu Lys Gly Asn Trp Leu Arg
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Tyr Val Asn Trp Ala Cys Ser Gly Glu Glu Gln Asn Leu Phe Pro Leu
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Glu Ile Asn Arg Ala Ile Tyr Tyr Lys Thr Leu Lys Pro Ile Ala Pro
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gag	aag	ggc	aac	tgg	ctc	cgc	tat	gtg	aac	tgg	gct	tgc	tca	gga	gaa	96
Glu	Lys	Gly	Asn	Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu	
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gaa	cag	aat	tta	ttt	cca	ctg	gaa	atc	aac	aga	gcc	att	tac	tat	aaa	144
Glu	Gln	Asn	Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys	
		35					40					45				

acc	tta	aag	cca	atc	gcg	cct	ggc	gag	gag	ctc	ctg	gtc	tgg	tac	aat	192
Thr	Leu	Lys	Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	
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Gly	Glu	Asp	Asn	Pro	Glu	Ile	Ala	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala	
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agc	gcc	cgg	agc	aag	cgg	agc	tcc	ccg	aag	agc	cgg	aga	ggg	aag	aag	288
Ser	Ala	Arg	Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Arg	Gly	Lys	Lys	
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aaa	tca	cag	gag	aat	aaa	aac	aaa	ggc	atc	aga	acc	cag	gct	gca	gcg	336
Lys	Ser	Gln	Glu	Asn	Lys	Asn	Lys	Gly	Ile	Arg	Thr	Gln	Ala	Ala	Ala	
			100					105					110			

cgg	aag	gcg	agc	gag	ctg	gac	tcc	acc	tct	gca	aac	atg	agg	ggc	tct	384
Arg	Lys	Ala	Ser	Glu	Leu	Asp	Ser	Thr	Ser	Ala	Asn	Met	Arg	Gly	Ser	
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Glu	Gln	Asn	Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys
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Thr	Leu	Lys	Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn
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Gly	Glu	Asp	Asn	Pro	Glu	Ile	Ala	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala
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Ser	Ala	Arg	Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Arg	Gly	Lys	Lys
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	100		105		110										
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